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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/681,687	10/08/2003	William L. Betts	61606-1891	7710

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THOMAS, KAYDEN, HORSTEMEYER & RISLEY, LLP
100 GALLERIA PARKWAY, NW
STE 1750
ATLANTA, GA 30339-5948

EXAMINER	
PANWALKAR, VINEETA S	

ART UNIT	PAPER NUMBER
2611	

DATE MAILED: 12/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/681,687	BETTS, WILLIAM L.	
	Examiner	Art Unit	
	Vineeta S. Panwalkar	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7,10-13,16-19 and 20* is/are rejected.

7)☒ Claim(s) *8,9,14 and 15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date *2/19/04,6/9/05*.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 1-3,5,10-13,16-18 and 20 rejected under 35 U.S.C. 102(b) as being anticipated by Weerackody (US 5457712), hereinafter, Weerackody.

1a. Regarding claims 1, 10, 12 and 16, Weerackody discloses a method for providing diversity wherein is disclosed a communication system comprising (the part of the preamble stating that the communication is for noise suppression has not been given patentable weight because it does not breathe life into the body of the claim):

- first logic configured to combine a time series of input symbols, where the time series has size N and N is greater than one, into a block of N-symbol combinations, where each of the input symbols is taken from a signaling constellation (See Figs. 4A and 5; Fig. 5 shows the channel coder 85 providing an illustrative block code--e.g., a conventional one-half rate repetition code with block length N=2 (claimed N greater than one). The repetition code provided by the channel coder 85 produces a code symbol d(n) [-1,1]. This symbol is repeated such that the output from coder 85 at time n comprises two symbols, a1(n) and a2(n). This is the claimed time series with size N. See column 7, lines 20- 30. Further, in column 2, lines 30-40, it is disclosed that an interleaver may be used to rearrange coded symbols to combat the effects of fading (Fig. 4A shows how the interleaver 25 is used after the data has been encoded by channel encoder 20. Since the interleaver takes the encoded symbols as input and rearranges (claimed combining) them into a block containing the same N symbols (but rearranged pseudorandomly), it is interpreted as the claimed first logic. Also, see column 6 line 59- column 7, line 16)); and

- second logic configured to transmit each N-symbol combination, on a separate channel, to a receiver (Fig. 5; the coded (and interleaved) symbols are then provided to a plurality of multipliers (M=2=N), transmission circuitry and antennas. Thus, each of the N symbols is transmitted on a separate channel via a separate antenna and the transmission circuitry 52 and antennas 55 are interpreted as the claimed second logic. See column 5, lines 30-50; column 2, lines 14-55 and column 9, lines 5-6).

Regarding claims 10 and 12, Weerackody discloses corresponding method and means respectively. Regarding claim 16, Weerackody shows how the claimed system maybe implemented using software (interpreted as claimed program embodied in a computer-readable medium) (Column 4, lines 51-61).

1b. Regarding claims 2, 11, 13 and 17, Weerackody further discloses the system comprising:

- third logic configured to receive a transmitted signal (Fig. 6, antenna 60 and receiver circuitry 62 are interpreted as claimed third logic circuitry. See column 8, line 34 – column 9, line 6); and
- fourth logic configured to combine the block of N-symbol combinations in order to recover the time series of input symbols (See 1a above. Just as Fig. 4A shows the interleaver, Fig. 4B shows a corresponding de-interleaver 68 used to recover the time series (column 2, lines 30-47) and is hence interpreted as claimed fourth logic).

Regarding claims 11 and 13, Weerackody discloses corresponding method and means respectively. Regarding claim 17, Weerackody shows how the claimed system maybe implemented using software (interpreted as claimed program embodied in a computer-readable medium) (Column 4, lines 51-61).

1c. Regarding claims 3 and 18, Weerackody also shows the system wherein each N-symbol combination in the block appears simultaneously as an output of the first logic (Since the output of the interleaver is an N-symbol combination in the block, each N-symbol combination in the block inherently appears simultaneously as an output of the first logic, as claimed).

Regarding claim 18, Weerackody shows how the claimed system maybe implemented using software (interpreted as claimed program embodied in a computer-readable medium) (Column 4, lines 51-61)).

1d. Regarding claims 5 and 20, Weerackody also shows the system, where the second logic transmits all N-symbol combinations simultaneously (Column 6, lines 10-21).

Regarding claim 20, Weerackody shows how the claimed system maybe implemented using software (interpreted as claimed program embodied in a computer-readable medium) (Column 4, lines 51-61).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 4, 6 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Weerackody in view of Moriya et al. (US 5651090), hereinafter, Moriya.

2a. Regarding claims 4, 6 and 19, Weerackody shows all the limitations disclosed (See 1a bove). However, Weerackody fails to explicitly disclose details about the weighting or scaling the input of the interleaver.

In the same field of endeavor, however, Moriya discloses interleaving:

wherein each N-symbol combination contains a weighted sample of all of the input symbols (Fig. 4a shows power normalization parts 33L1 to 33Ln and 33. R1 to 33Rn which normalize the powers of the residual coefficients in the respective subchannels; weight calculation 34L1 to 34Ln and 34R1 to 34Rn which multiply the spectral envelopes in the respective subchannels by corresponding power normalization gains and output, as weighting factors V (vectors). Column 14, lines 5-50. This is interpreted as claimed weighing and scaling).

Thus, it would have been obvious to a person of ordinary skill in the art to use the weighing or normalization techniques prior to interleaving as suggested by Moriya because it permits reduction of overall coded signal distortion..(Column 4, line 65- column 5, line 5).

3. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Weerackody in view of Voith et al. (US 5636224), hereinafter, Voith.

3a. Regarding claim 7, Weerackody shows all the limitations disclosed (See 1b above). However, Weerackody fails to explicitly disclose details about the noise energy distribution.

In the same field of endeavor, however, Voith discloses interleaving:

- where noise energy present in each of the time series of input symbols is spread among at least one of the N-symbol combinations such that the noise energy is reduced (Column 1, lines 25-35. Voith shows how interleaving is used to reduce the impact of noise because it spreads the noise over different codewords. Thus, it is implied that any noise present in the input symbols will also be distributed or spread so as to reduce the noise energy contained in them by using interleaving).

Thus, it would have been obvious to a person of ordinary skill in the art to use interleaving as disclosed by Voith because it reduces the effect of noise by spreading it over different codewords.

Allowable Subject Matter

3. Claims 8,9,14,15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter:

3a. Regarding claims 8 and 14, prior art of record fails to show a communication system comprising logic configured to re-interleave the block of N-symbol combinations in order to generate error signals used to update adaptive algorithms, in combination with each and every other limitation of the claims and their base claims.

3b. Regarding claims 9 and 15, prior art of record fails to show a communication system comprising fifth logic configured to de-interleave the block of N-symbol combinations to produce a block of N de-interleaved reference symbols; sixth logic configured to re-interleave the block of N de-interleaved reference symbols to produce a block of N interleaved reference symbols; seventh logic configured to update a decision feedback equalizer with each of the N interleaved reference symbols, in combination with each and every other limitation of the claims and their base claims.

Conclusion

4. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

- Paik et al. (US 5241563) show method and apparatus for communicating 7interleaved data
- Cimini, Jr. et al. (US 6208669 B1) show method and apparatus for mobile data communication where interleaved data are transmitted simultaneously.

- Martin et al. (US 5960039) show method and apparatus for high data rate transmission where interleaved data are transmitted simultaneously.
- Kato (US 5177767) shows spread spectrum communication wherein the transmitter multiplies an original signal by each subdivision of the code to produce n-number of new baseband signals.
- Ramsey, “Realization of Optimum Interleavers”, IEEE Transactions on Information Technology, VOL. IT_16, NO, 3, May 1970, shows how interleavers can be realized optimally to reorder sequence of symbols.

Contact Information

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Vineeta S. Panwalkar whose telephone number is 571-272-8561. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Mohammad Ghayour can be reached on 571-272-3021. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

TESFALDET BOCURE
PRIMARY EXAMINER